

Risk Ranking Methodology for Radiological Events

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Risk ranking schemes have been used in safety analysis to distinguish lower risk accidents from higher risk accidents. This is necessary to identify those events that might warrant additional study and to ensure that any resources allocated for risk reduction are properly directed.

A common method used for risk ranking utilizes risk matrices. These are typically 3x3 or 4x4 matrices, having event consequences along one axis and event frequency along the other. Each block on the risk matrix represents some level of risk, and blocks presenting similar risk are often grouped together into one of 3 or 4 risk categories. Once a risk matrix has been defined, events are placed on the matrix based on an estimate of the event consequence and event frequency. Since the risk associated with each block on the matrix can be found as the product of frequency and consequence, then the relative risk associated with each event is determined by its position on the matrix.

In most cases, the frequency axis of the matrix has some numerical range associated with it, typically spanning one to two orders of magnitude. Often, the consequence axis is based on a qualitative scale, with discrete bins, where consequences are judgment based. However, the consequence scale generally has implicit quantitative values associated with it. Risk categories are often arbitrarily assigned (or assigned on the basis of symmetry). This presents a problem in that if the blocks of the risk matrix are not logically grouped, then incorrect conclusions can be drawn about the relative risk presented by events at a facility.

This paper will present a methodology for establishing risk matrices that can be used to rank the risk of radiological events at a facility. It will show how blocks on a risk matrix can be properly grouped so that all of those in a given risk category do in fact, represent similar risk. In order to elicit meaningful information with regards to risk presented by events at a facility, the methodology can be tailored to be specific to the range of consequences that may potentially occur at that facility. In addition, the basis on which risk categories are assigned can also be varied in order to produce the most meaningful results for a given facility. Some examples of applying the methodology will be provided, as well as counter-examples showing flawed attempts at using risk matrices.